

# Research on the Digital Protection and Inheritance Path of Liao Dynasty Ancient Pagodas

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**Abstract.** Under the background of the digital intelligence era, this paper discusses the significant importance of the digital protection and inheritance of cultural heritage of ancient pagodas from the Liao Dynasty, expounds the guiding ideology of digital protection and inheritance, and proposes the method of comprehensive utilization of digital technologies such as data collection, database construction, digital modeling, digital maps, and digital museums. These methods aim to promote the digital protection and inheritance of Liao Dynasty ancient pagodas and provide innovative approaches for the dissemination of their history, art, and culture.

**Keywords:** Liao Dynasty Ancient Pagodas; Digital Protection; Cultural Heritage.

## 1. Introduction

The ancient pagodas of the Liao Dynasty represent the cultural heritage of the ground structures from the Liao period in Liaoning Province. They hold an important position in the study of history, ancient architecture, and multi-ethnic culture in the Northeast and North China regions. The pagoda buildings in the Liaoning area, where the Khitan people once lived, are included as cultural relics protection units of various levels, with a total of 40 Liao pagodas. As an outstanding example of ancient Chinese architecture, Liao pagodas possess profound artistic value. Their architectural style, decoration, structure, and cultural background all endow them with unique artistic charm. However, with the rapid development of internet thinking and digital technologies, the period for the digital protection and inheritance of Liao Dynasty ancient pagodas has arrived.

## 2. Significance of the Digital Protection and Inheritance of Liao Dynasty Ancient Pagodas

The Liao Dynasty was an important period in the history of Chinese pagoda and temple construction with great historical influence. Not only were a vast number of pagodas and temples built during the Liao ruling period, but their artistic style also bridged that of the Tang and Song dynasties, featuring reasonable structures and smooth lines in architectural molding which, to some extent, influenced the style of subsequent pagoda and temple construction. Digitally protecting the ancient pagodas of the Liao Dynasty in the Liaoning region, forming complete digital archives, and disseminating and exhibiting them provides the most direct approach and the most important innovative form for the transmission of historical culture. Their research value and significance are mainly reflected in the following aspects:

### 2.1. Ancient Pagodas of the Liao Dynasty are Precious Historical and Cultural Heritage

Ancient pagodas of the Liao Dynasty are precious historical and cultural heritage. the Shifo Temple pagoda located in Shenbei New District, Shenyang City, which was built during the Xianyong period (the tenth year) as a hexagonal seven-layered dense eave brick pagoda. In the past, it was severely damaged, with only the base and part of the pagoda body remaining in the south, southeast, and northwest. Digital technology ensures that these precious cultural heritages are preserved and can be passed down even in the face of natural disasters, man-made destruction, or changes over time. Digital means are used for the digital collection, storage, restoration, display, and dissemination of ancient buildings, avoiding the damage caused by direct physical contact with historical monuments and

reflecting the important manifestation of long-term and effective protection and inheritance of cultural heritage.

## **2.2. Liao Dynasty Ancient Pagodas Contain Tremendous Economic and Cultural Values**

Liao Dynasty ancient pagodas can be developed as local tourism brands, attracting visitors to experience history and culture. At the same time, cities or villages around the pagodas often develop tourism infrastructure, such as hotels, restaurants, and travel agencies, to meet the needs of visitors. These investments help improve the city's infrastructure-driving tourism and economic development while also promoting cultural relics protection. They play an active role and have important significance in accelerating the inheritance of excellent historical culture, enhancing the confidence of cities and ethnicities, and promoting the cultural and tourism industry's development.

## **2.3. 'Internet Plus' Digital Protection is the Information Bridge between Audiences and Monuments**

Through the internet, people directly obtain the information they want, and interesting interactive designs with digital products also enhance users' experience and attention. This breaks through the time and space limitations people face when visiting immovable cultural relics, allowing the cultural value of Liao Dynasty ancient pagodas to be shared by people worldwide.

## **3. Guiding Ideology of Digital Protection and Inheritance of Liao Dynasty Ancient Pagodas**

By conducting resource surveys and sorting out information on the architecture, art, history, and cultural relics of the Liao Dynasty ancient pagodas, this integrates advanced digital technology organically into pagoda research work, aiming to improve the level and quality of research. Digital technology planning will cover multiple aspects such as digital collection, database construction, digital mapping, and digital display, constructing a complete digital knowledge system and technical framework. It merges the latest research findings from various disciplines and fields, thereby reducing the project's investment and risk and creating a digital work of Liao Dynasty ancient pagodas with high protection and research value. This aims for breakthrough progress in the digitalization of ancient architectural heritage, mastering a series of digital construction technologies, and promoting the progress of digital protection and inheritance of cultural heritage to ensure better protection and inheritance of these precious pagodas.

## **4. Digital Protection Strategy of Liao Dynasty Ancient Pagodas**

Digitalization refers to the process where digital technologies in the information field comprehensively advance into all areas of human life, including the transition from traditional analog to digital modes in the communication and media fields. The Liao Dynasty ancient pagodas are massive and spectacular, inheriting the majestic style of Tang Dynasty architecture while exuding the boldness of northern ethnicities. For the digital protection and construction of Liao Dynasty ancient pagodas, the starting point should be dynamic development, holistic protection, and mutual interconnectivity. By collecting, organizing, digitalizing, disseminating, and utilizing detailed information resources, it is necessary to follow the principles of unified leadership and graded management and further promote the development of digital protection technology for cultural relics.

### **4.1. Digital Collection**

Data collection, also known as data acquisition, is an important foundation and premise of the digitalization process, with the main purpose of collecting signals recognizable by computers and converting analog signals into digital signals through input devices. A comprehensive and multidimensional collection and recording of information on the historical background, roles, and humanistic environment of ancient buildings are conducted. The collected data are then sorted, classified, generalized, and analyzed. On-site data measurements of the current state, dimensions, and

carvings of Liao Dynasty cultural relics are performed using three-dimensional scanning technology, and accurate data are obtained directly through research and measurement, ensuring the comprehensiveness and integrity of resource collection, which is beneficial for the value research, protection and restoration, and exhibition utilization of the pagodas.

#### **4.2. Database Construction**

Establish a database containing relevant information on Liao Dynasty ancient pagodas, facilitating research and management for researchers and cultural heritage conservationists. Collect relevant information on Liao Dynasty ancient pagodas, including geographical location, architectural features, historical background, etc. Set up a database structure, including the design of data and fields, data integrity constraints, to accommodate different types of information. Enter and organize previously collected Liao pagoda data, ensuring the accuracy and completeness of the data. Use the database to manage and analyze the information systematically, improving the efficiency and quality of research and protection work on Liao Dynasty ancient pagodas.

#### **4.3. Digital Modeling**

The production of the 3D digital model of the ancient pagodas from the Liao Dynasty is based on the data collected in the early stage, such as the dimensions and styles of various parts of the ancient buildings, as well as data on the surrounding terrain and architectural complexes. The base model can be completed using 3dsMax and ZBrush software, where 2D lines are drawn using software tools and extruded to create a three-dimensional effect. Using the Poly modeling method, commands such as insertions and extrusions are executed to create models of each part of the building. After the main building model is established, models of the surrounding scenes such as nearby buildings, terrain, and plants are also produced. In addition, a large number of pictures are collected and taken on site as material for texture maps, making the restoration work appear more realistic and achieving the goal of architectural restoration and preservation.

### **5. Research on Digital Display and Dissemination of Ancient Pagodas from the Liao Dynasty**

Digital display and dissemination extend and expand the digital storage of ancient pagodas from the Liao Dynasty. By utilizing modern digital technology, the "productivity" and "dissemination power" of digitalization are fully harnessed. Through establishing digital maps, digital museums, digital films, digital games, etc., with a brand-new perspective and interactive experience, digital, artistic, narrative, and interactive methods are used to embark on an exploratory journey into society, history, culture, and art. The history, architectural style, sculptural art, and stories related to the Khitan culture of the Liao Dynasty pagodas are communicated globally, providing strong technical support for the inheritance of Chinese culture.

#### **5.1. Establishing a Digital Map**

A digital map is a map recorded and stored in digital form based on a map database with geospatial encoding. Since the pagodas from the Liao Dynasty are scattered across different regions, establishing a digital cultural map of the Liao Dynasty pagodas can present this significant cultural heritage to the public more effectively and promote the understanding and research of Liao Dynasty history and culture. GIS (Geographic Information System) software is used to create cultural maps, marking the position of each pagoda on the map and using different icons or colors to represent the types or characteristics of pagodas and the topological relationships in map space. Interactive elements are added to the map, allowing users to move, rotate, and zoom interactive objects in the scene and have an immersive experience. It is a visualization of an on-the-ground map that can comprehensively and vividly describe the terrain and landforms. It displays to the public the true geographical information of the distribution of Liao Dynasty ancient architectural resources, cultural background, visitor information, and other related information, fully showcasing the historical and cultural value of the Liao Dynasty pagodas.

## **5.2. Establishing a Digital Museum**

A digital museum is a virtual museum based on digital technology, which digitizes the collections, exhibitions, and cultural resources of the museum with the help of digital media technology, the Internet, and virtual reality technology, making them more open and accessible to the public. Internet products such as websites, animations, 360 virtual panoramic museums, multimedia publications, WeChat platforms, APPs, etc., are used as dissemination forms, and multimedia materials such as audio, video, and animations are provided to enrich the content of exhibitions, breaking through spatial-temporal limitations. Transitioning from a single media display to an integrated multimedia performance enhances the presence and immersion, allowing visitors to visit the pagodas as if they were on-site, understanding their architectural style, historical background, and cultural value. Through the digital museum, the cultural heritage of the Liao Dynasty pagodas will be better protected and inherited.

## **5.3. Creating Digital Films**

Digital films are created using digital cinematography, special effects, composition, and other technical means to tell stories about the history, architectural features, and legends of the Liao Dynasty pagodas. They are presented in digital media formats such as videos, animations, or anime, creating scenes with coexisting narratives to break away from the conventional presentation of historical relics, making the dissemination of the Liao pagoda's cultural heritage more vivid, lively, and touching. These short films can be played on various platforms, such as museum touch screens, social media, and entertainment systems, making the display and dissemination of cultural heritage more vivid and multidimensional. It meets the audience's multi-sensory experience with a visual core, enhancing the cultural infection power in all directions, and strengthening the observability of civilization and the sensibility of culture.

## **5.4. Developing Digital Games**

The unique value of digital games in promoting excellent traditional culture is recognized. Digital media technologies such as 3D modeling, virtual reality, and augmented reality are utilized to develop digital games incorporating elements of the Liao Dynasty pagodas. Core gameplay is designed, including puzzle-solving, exploration, and educational elements. Engaging game plots are created, and the interactive experience parts of the game are developed to enable players to interact with the pagoda and its environment within the game, such as exploring the secrets within the pagoda and unraveling historical mysteries. These games help players understand and learn this part of history and experience the historical ambiance of the pagodas in a virtual environment. They are released and promoted through various channels, allowing more players to learn about and experience the game, thus achieving the purpose of disseminating the culture of the Liao Dynasty pagodas. This is also an innovative way of inheriting traditional culture.

## **6. Conclusion**

In the digital age, multidisciplinary integration has become the mainstream trend in the protection and inheritance of cultural heritage. By recording and protecting the Liao Dynasty pagodas through digital technology and integrating the rich history and ancient architecture of the Liao era, they are being spread and displayed globally, promoting the inheritance and prosperity of ancient architectural culture. Innovating through the integration of culture and technology to promote China's excellent historical, architectural, and landscape culture is of great importance in promoting the Internet+ Chinese civilization and strengthening cultural confidence.

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## **References**

- [1] Lan Zhongying. A Study on the Art Archaeology of Liao Dynasty Pagodas in the Western Liaoning Region [D]. Master's Thesis, Shenyang Normal University, 2016.
- [2] Liu Hainian, Wang Xingye. Research on the Distribution of Pagoda Architecture in Liaoning Province. Liaoning Museum Journal, 2014(12): 135-141.
- [3] Liu Changjiang. Retrospect and Prospect of the Research on Liao Dynasty Ancient Pagodas in Shenyang Area. Liaoning Museum Journal, 2014(12): 135-141.
- [4] Zhao Jingjing. Research on the Digital Display Technology of Cultural Relics and Sites of Liao Dynasty. Today's Media, 2022(8): 113-116.
- [5] Jia Xiuqing, Wang Jue. The Application of Digital Means in the Inheritance and Innovation of Cultural Heritage in China. Modern Communication (Journal of Communication University of China), 2012(02): 112-115.